

Name \_\_\_\_\_

Math 1  
Exam 4

For all problems, show all work. You may use a graphing calculator. Do not round unless instructed otherwise. Good luck. ☺

For the first three problems, use the following information:

The temperature  $T$  in degrees Fahrenheit of Mr. Buck's coffee after  $t$  minutes is given by

$$T = 130(0.94)^t + 70.$$

1. (4B) Determine the starting temperature of Mr. Buck's coffee.
2. (4B) Determine the temperature of the room in which Mr. Buck has put his coffee. Explain your reasoning.
3. (4C) Determine the domain and range of this function. (Your answers should account for whether the function is discrete or continuous.)
4. (4B, 4D) Determine the average rate of change of the function  $f(x) = \left(\frac{3}{2}\right)^x$  over the interval  $[-1, 2]$ .

5. (4A) For the following list of equations, circle the ones that have a graph which passes through both  $(0, 5)$  and  $(3, 0)$ . (There might be more than one correct answer. Also, there might be no correct answers.)

$$y = \frac{5}{3}x + 5$$

$$3x + 5y = 15$$

$$y + 5 = \frac{-5}{3}(x - 6)$$

$$y = \frac{-5}{3}x + 5$$

$$5x + 3y = 15$$

$$y - 5 = \frac{3}{5}x$$

6. (C3, 4A, 4B) Which of the following functions grows faster for large values of  $x$ :  $g(x) = 1000x + 150$  or  $h(x) = 1.01^x$ ? Explain your reasoning.

7. (4E) Nil starts out with \$300, and he spends \$10 each day. Write a function that models this scenario. Be sure to define all variables appropriately.

8. (4E) A new element Donninium has the property that, every two seconds, only four fifths of the amount that was present at the beginning of the two second period remains. (The other fifth has radioactively decayed into smaller atoms.) Write a function that models the remaining mass over time of an original sample of 40 kg of Donninium. Be sure to define all variables appropriately.